How Your Brain Tracks Moving Objects

Denise Chow, LiveScience Staff Writer | May 08, 2013 12:24pm ET

Studying how visual information is processed helps scientists understand how the brain tracks objects in motion.

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When a baseball player hits a home run off a 100-mph fastball, how can the slugger's brain track such a fast-moving object? Scientists may now have the answer.

In a new study, they discovered how the brain can predict the path of a moving object, even one traveling so fast humans can barely see it.

Vision scientists at the University of California, Berkeley, studied how the brain processes visual information, and located the specific region of the brain responsible for calculating where a moving object will most likely end up.

When human eyes see an object, it takes one-tenth of a second for the brain to process that information, said Gerrit Maus, a postdoctoral fellow in psychology at UC Berkeley, and lead author of the new study detailed today (May 8) in the journal Neuron. So how does the brain compensate for the slight delay? [10 Odd Facts About the Brain]

"The brain does not think the object is in the position where the eye tells us it [that it] is," Maus told LiveScience. "The object is shifted forward in the direction that it's moving, so we're actually predicting where things are going to be."

This means the brain perceives moving objects to be farther along in their trajectory than what a person actually sees with their eyes, he explained.

"The fundamental problem is that our brain doesn't work in real-time," Maus said. "The brain actually works rather slow, compared to some electronics or computers that we have today. Information that the brain receives from the eye is already out of date by the time it gets to the visual cortex."

Maus and his colleagues studied the brains of six volunteers using functional magnetic resonance imaging (fMRI), which indirectly measures brain activity by measuring changes in the blood flow in the brain.

The volunteers' brains were scanned as they watched an illusion called the "flash-drag effect," in which brief flashes of light shift over a moving background.

"The background is moving at the same time, so we perceive the flash being dragged along by the motion," Maus explained. "The brain interprets the flash as part of the moving background, and therefore engages the prediction mechanism to shift the position of the flash."

In another part of the exercise, the light flashes over a still background. When the scientists compared the patterns of neural activity, they found that in both cases, the activity occurred in a region called V5, which is located in the middle temporal region of the visual cortex — an area at the back of the head and to the side.

This suggests that the V5 region is involved in tracking moving objects, pushing them along in their trajectories so that a person, such as a baseball player hoping to hit a fastball, is not constantly processing out-of-date information, the researchers said.

"What we perceive doesn't necessarily have that much to do with the real world, but it is what we need to know to interact with the real world," Maus said.

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Editor's Recommendations

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